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Indian Standard

PLIERS, PINCERS AND NIPPERS — TECHNICAL SUPPLY CONDITIONS

(Second Revision)

भारतीय मानक

प्लासों, संडसियों, एवं निपरों की तकनीकी पूर्ति शर्तें

(दूसरा पुनरीक्षण)

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BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

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Price Group 4

Assembly Hand Tools Sectional Committee, PE 05

FOREWORD

This Indian Standard (Second Revision) was adopted by the Bureau of Indian Standards on 8 August 1989, after the draft finalized by the Assembly Hand Tools Sectional Committee had been approved by the Production Engineering Division Council.

This standard deals with the general requirements of the pliers, pincers and nippers of different varieties as given below:

a) *Pliers*
  1) Combination side cutting (IS 3650)
  2) Flat nose (IS 3552 and IS 8672)
  3) Round nose (IS 3568)
  4) Snipe nose (IS 5658)
  5) Duckbill (IS 4481)
  6) Pipe grip (IS 5995)
  7) Parallel action flat nose (IS 6086)
  8) Fencing (IS 5067)
  9) Lineman's (IS 6078)
  10) Battery terminal (IS 5006)
  11) Heat coil (IS 4806)
  12) Burner (IS 3569)
  13) Eyelet (IS 3529)
  14) Glass (IS 5066)
  15) Slip joint (IS 6118)
  16) Wire stripping (IS 5087)
  17) Internal circlips (IS 7989)
  18) External circlips (IS 7990)

b) *Pincers* (IS 4095)

c) *Nippers*
  1) Diagonal cutting [IS 4378 (Part 1)]
  2) End cutting [IS 4378 (Part 2)]
  3) End cutting (Toggle lever assisted) (under preparation)

This standard was first issued in 1964 and was revised in 1981, when material and cutting test were modified. This second revision has been taken up in order to align the standard with the work done at the international level. In this revision, reference to IS 11526 : 1986 'Nomenclature of pliers, pincers and nippers' has been made and designation clause has been included. Besides, the handle load test has been modified and explained. Cutting test and torsion test have also been modified and aligned with the international practice. However, sizes have not been aligned as there is demand of other sizes in the country.

While revising this standard, considerable assistance has been taken from the following standards:

ISO 5743 : 1982	'Pliers and nippers — General technical requirements', issued by the International Organization for Standardization (ISO)
ISO 5744 : 1983	'Pliers and nippers — Methods of tests', issued by the International Organization for Standardization (ISO)

Indian Standard

PLIERS, PINCERS AND NIPPERS — TECHNICAL SUPPLY CONDITIONS

(Second Revision)

1 SCOPE

1.1 Covers the technical supply conditions for pliers, pincers and nippers used manually for gripping and cutting.

2 REFERENCES

2.1 The following Indian Standards are necessary adjuncts to this standard:

IS No.	*Title*
2155 : 1982	Cold forged solid steel rivets for hot closing (6 to 16 mm diameter)
2500 (Part 1) : 1973	Inspection by attributes and count of defects (*first revision*)
3749 : 1978	Tool and die steel for cold work (*first revision*)
11526 : 1986	Nomenclature for pliers, pincers and nippers

3 NOMENCLATURE

3.1 For the purpose of this standard, the nomenclature as given in IS 11526 : 1986 shall apply.

4 SHAPE, SIZES AND DIMENSIONS

4.1 The shape, sizes and dimensions of pliers, pincers and nippers shall be as specified in the relevant Indian Standards. Other shapes of handle, nose and gripping surfaces as specified in IS 11526 : 1986 may be adopted if agreed to between the manufacturer and the purchaser.

5 MATERIALS

5.1 Pliers, Pincers, Nippers and Rivets

5.1.1 Suitable carbon or alloy steels meeting the requirements of hardness and other tests as laid down in the respective Indian Standards:

Suitable example :

Pliers, pincers and nippers	65T6, 70T3 and 75T6 conforming to IS 3749 : 1978
Rivets	Conforming to IS 2155 : 1982

5.2 Insulation

In the case of insulated tools, the insulating sleeve or insulation material used shall be of such a quality as to withstand the insulation tests specified in **9.6**. The test voltage shall not be indicated on the insulation or on tool.

> CAUTION — The fact that handles of pliers, pincers, and nippers are insulated is no guarantee of immunity from electric shock. Although insulated tools may have withstood high voltages, damage due to subsequent dropping or the presence of liquid or perspiration may impair insulation. It is, therefore, recommended that complete reliance should not be placed on insulated handles.

6 HARDNESS

6.1 The hardness shall be tested at three points on flat and parallel surface near to each of the cutting edge (not beyond 3 mm away) and for body it shall be tested adjacent to the gripping surfaces (not more than one mm away). The values of hardness measured at any point shall be within the limits as given below:

Body (Gripping surfaces or jaws)	:	350 to 510 *HV* (≈ 35 to 50 *HRC*)
Near the cutting eldges	:	510 to 700 *HV* (≈ 50 to 60 *HRC*)

7 MANUFACTURE

7.1 The pliers, pincers and nippers shall be solid forged to shape. The rivets shall be interference fit in one of the arms and free fit in the other, and shall be finished flush with the surfaces. The jaws (gripping surfaces) and the cutting edges shall be properly hardened and tempered. The serrations in the jaws shall be neatly cut to provide a firm grip. In case of pliers having insulated handles, insulation shall cover the whole of the handle including the outer ends and particularly on all types of side cutting pliers it may be shouldered at the head end.

7.2 Handles

Handles shall be shaped to afford a comfortable grip and shall prevent accidental pinching of the hand (for details on types of handles, refer IS 11526 : 1986).

7.2.1 *Handle Finish*

The handles shall have one of the following finishes:

a) Smooth finished,
b) Black oxide finished,
c) Phosphate coated,
d) Lacquered,
e) Electroplated,
f) Plastic coated or with plastic sleeves, or
g) Knurled.

NOTE — Plastic coated or plastic sleeve are meant for gripping comfort only.

7.3 Joints

The joints shall be made to allow a free movement from the closed to open position and shall be free from excessive side movement in any position that may impair its function. For details on types of joints, refer IS 11526 : 1986.

8 WORKMANSHIP AND FINISH

8.1 Workmanship

The pliers, pincers and nippers shall be free from pits, cracks, scale, seams, fins and other defects. They shall be finished smooth all over. All sharp edges, other than the cutting edges, shall be removed. The pliers, pincers and nippers shall work freely without any undue play or stiffness at the joints. The jaws of the pliers shall be in perfect alignment with each other and shall either meet completely and evenly in the closed position or shall have a gap of 0·5 mm, *Max* in the closed position, depending on the type of pliers.

8.2 Tool Finish

Pliers, pincers and nippers shall be given anti-corrosive treatment to avoid corrosion. The tools shall be given one of the following finishes:

a) Natural finish,
b) Chemically produced oxide finish,
c) Chemically produced phosphate coating,
d) Lacquered,
e) Electrodeposited metallic coating like nickel-chromium electroplating, or
f) Polished.

9 TEST

9.1 Cutting Test (for Pliers Provided with Cutting Edges and for Nippers)

9.1.1 *Hard Wire Cutting Test*

A piece of steel wire of suitable diameter and physical characteristics as recommended in Table 1 having a minimum 140 kPa (140 kg/mm^2) tensile strength shall be used. The plier shall be placed in a test equipment. Insert the test wire in the cutting edge of the tool and apply a force F_1 to the handles at a point L_1 for the size and type of tool. For end cutting nippers, test wire shall be placed in the centre of the cutting edges. (For details of F_1, L_1 and L_2, *see* relevant Indian Standard of the product.)

Table 1 Hard Test Wire Characteristics

Size of Plier mm	Test Wire Diameter (D) mm	Cutting Force (F_2) N
125	1·5	3 500
140		
150	1·75	4 000
160		
180		
200	2·0	7 500
250		

NOTE — Cutting force F_2 is meant for calculating F_1 only.

If the wire cutting test can not conveniently be carried out at the points defined by L_1 and L_2, then more suitable positions may be chosen defined by L_1 and L_2. The cutting force F_1 shall then be calculated as :

$$F_1 = \frac{F_2 \times A \times L_2}{L_1}$$

where

F_1 is the maximum cutting force

F_2 is the cutting force as specified in Table 1

A is the correction factor which is 2 for hard test wire

After completion of test, the cutting edges shall show neither visible indentation nor distortion which would affect the cutting performance of the tool. The tool shall also not show any damage which may affect its use.

9.1.2 *Soft Wire Cutting Test*

After completion of hard wire cutting test, pliers and nippers shall be capable of cutting soft wires of characteristic specified in Table 2. The test wire shall be held by hand and placed between the cutting edges. Test wire shall be cut off completely without being exposed by stress caused by bending or pulling which may facilitate the cutting operation.

Table 2 Soft Test Wire Characteristics

(*Clause* 9.1.2)

Tool	Type	Wire Material	Test Wire Diameter mm	Tensile Strength MPa
Nippers	Diagonal cutting nippers	Bronze—CuSn 6	1·5	740 to 830
	End cutting nippers	Bronze — CuSn 6	1·5	740 to 830
Pliers	Snipe nose pliers with side cutters	Bronze — CuSn 6	1·0	740 to 830
	Engineers' and line man's pliers	Copper — ETP	1·0	210 to 250

NOTES

1 The diagonal cutting nippers shall cut the test wire at atleast 2/3 of total cutting edge length measured from the point of the jaw whereas other pliers and nippers shall cut the specified test wire over the whole cutting edge length.

2 In case of bronze wire specified above, any alternative materials may also be used, provided that they have same diameter and ultimate tensile strength.

9.2 Tube Gripping Test (for Pliers)

A piece of mild steel pipe of 15 mm nominal diameter shall be held in a vice securely and then gripped with the plier at the pipe grip. The plier shall then be rotated as though attempting to turn the pipe in the vice. The pipe shall not rotate but shall get marked fairly uniformly by the jaw serrations and the latter shall not be damaged.

9.3 Shock Test

The pliers, pincers and nippers shall be capable of withstanding, without any sign of damage, the test of having the nose struck with normal manual force against a mild steel block while being held manually by the handles.

9.4 Torsion Test (for Pliers Only)

9.4.1 The tool to be tested shall be placed in equipment. Depending on type and size of the tool, insert the point of the jaws into a suitable test piece specified at **9.4.2**. Apply the handle load F at a distance L_1 from the rivet and clamp the handles to resist the turning moment (*see* Fig. 1). Apply the torque T as specified in relevant standard, in both directions. The angular moment α° shall not exceed the values given for the types and size of the tool. After loosening of the joint or, permanent set of the jaws resulting from the test, the plier shall not impair the efficient functioning of the tool.

9.4.2 *Test Piece for Torsion Test*

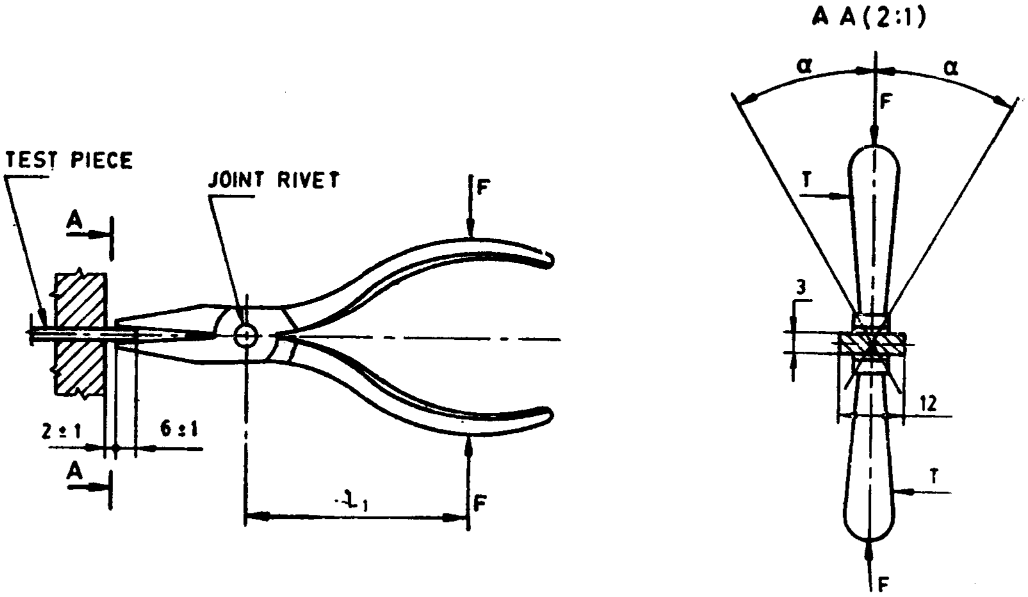
For flat nose pliers, the test piece shall be 3 mm thick, 12 mm wide and shall have a hardness of 45 to 50 *HRC*. The test piece shall be inserted between the jaws of the plier to a depth of 6 ± 1 mm. For round nose pliers, the points of the jaws shall be supported in a test piece with two holes. The holes shall be 3·6 mm in a diameter, 3 mm deep with flat bottoms, spaced on the centre line at a distance of 4 mm between the inner edges. The test piece shall have hardness between 45 to 50 *HRC*. For illustration, *see* Fig. 1 and 2.

9.5 Handle Load Test

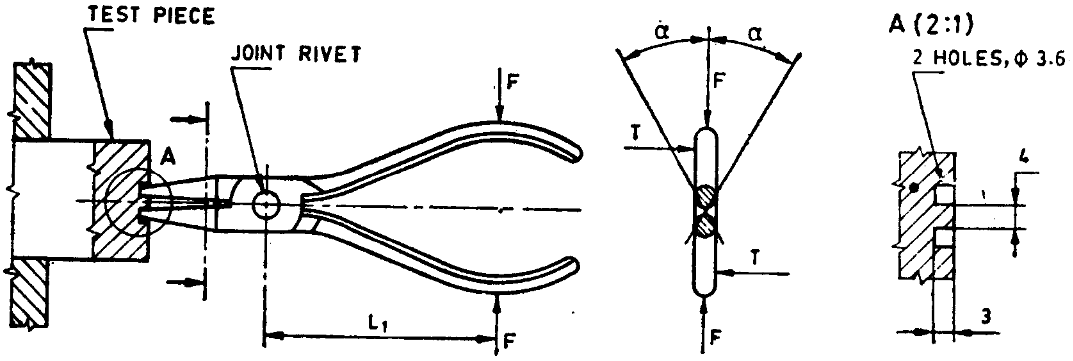
The pliers, pincers and nippers shall be mounted in a suitable test fixture based on the principles illustrated in Fig. 3, (p 8) for the handle load test. An initial load of 50 *N* (5 kgf. approx) shall be applied at a distance L_1 from the rivet, keeping a suitable test piece as given at **9.5.1** in the jaws. The distance between open ends of the handles (w_1) shall be measured. The initial load shall then be increased to the specified test load appropriate to the tool. Then reduce the load to the initial load of 50 N. The distance between open ends of the handles (w_2) shall then be measured at the same distance L_1. The difference between the first and second reading ($s = w_1 - w_2$) shall not exceed the value of permanent set specified in the relevant Indian Standards. After this test the tool shall show no deformation that may affect its use.

For lever-assisted pliers, a load of 0·5 × F (test load) shall be applied and reduced to 50 N. The distance between open ends of the handles (w_1) is measured. The load is then increased to the specified test load and reduced to 50 N. The distance between open ends of the handles (w_2) shall be measured at the same distance L_1 and permanent set ($s = w_1 - w_2$) is calculated.

For illustrations *see* Fig. 4.



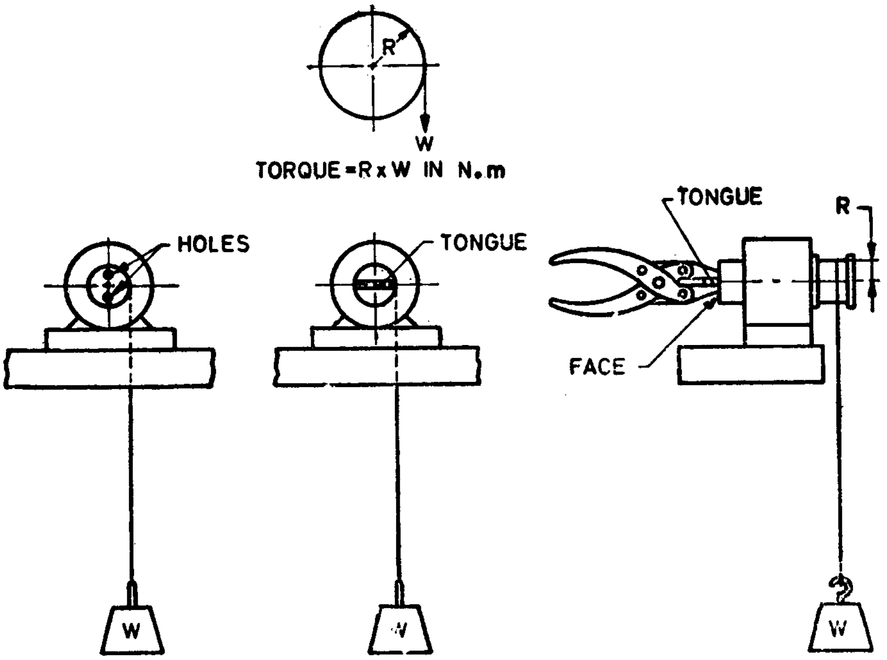
1A Flat Nose Plier



1B Round Nose Plier

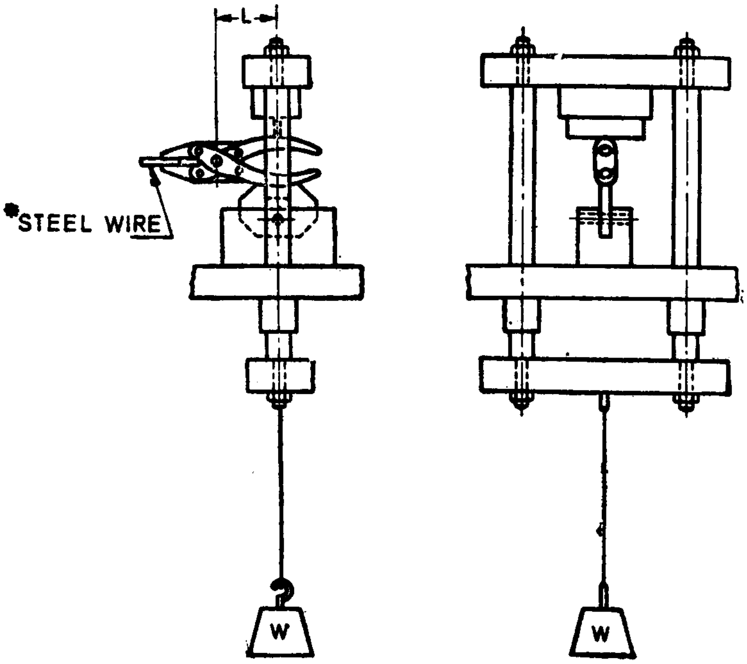
All dimensions in millimetres.

FIG. 1 TORQUE TEST ILLUSTRATIONS



NOTE — The face shall be provided with tongue piece or holes.

FIG. 2 TORSION TEST

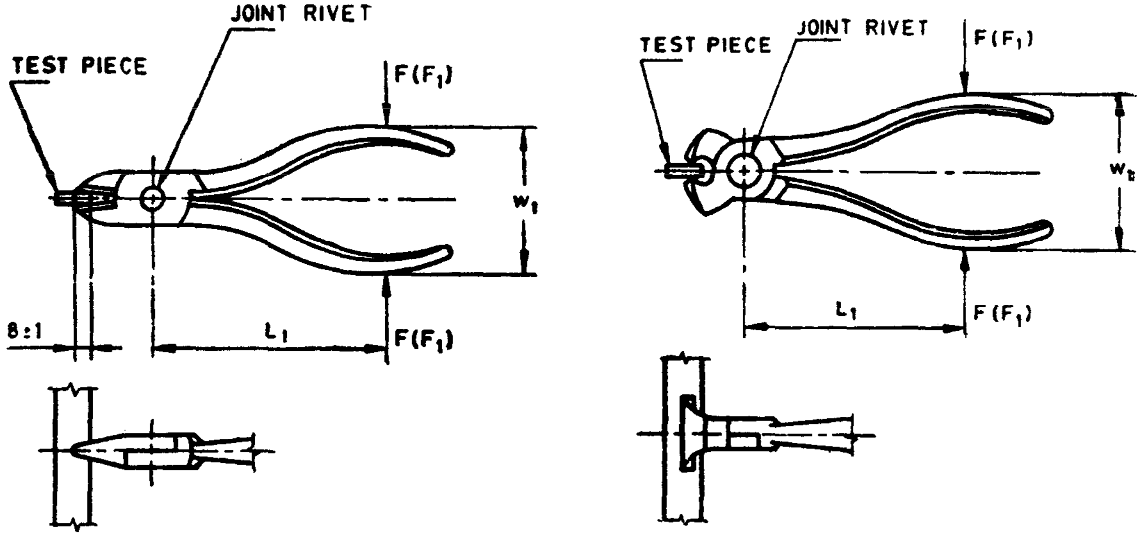


*Diameter of wire, *see* **9.1.1**

Length 12 mm, *Min*

Depth of insertion in jaws : 3 mm, *Min* 6 mm, *Max*

FIG. 3 TYPICAL TEST ARRANGEMENT FOR HANDLE LOAD TEST

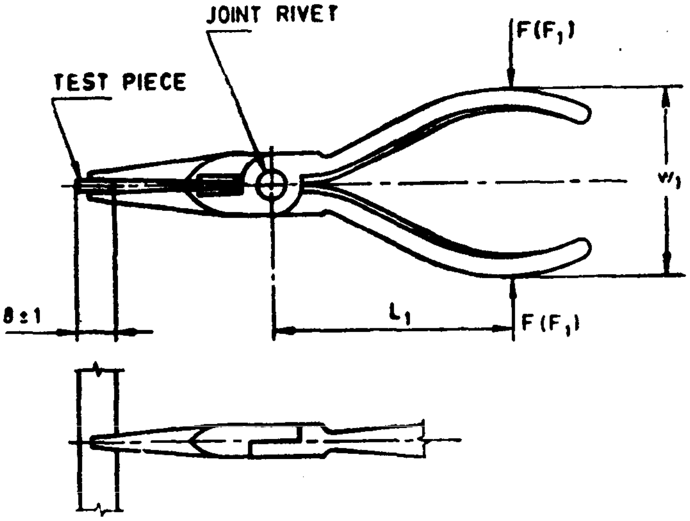


F = Load applied in load test
F_1 = Load applied in cutting test

4A Diagonal Cutting Nipper

All dimensions in millimetres.

4B End Cutting Nipper



4C Snip Nose, Flat Nose and Round Nose Plier

Fig. 4 Handle Load Test

9.5.1 *Test Piece for Handle Load Test*

The test piece shall have a hardness value of 30 – 40 *HRC* and shall be of such a size and profile as to make contact over a length of 8 ± 1 mm from the point of the jaws. For end cutting nippers, the test piece shall make contact over the full length of the jaws. With the test piece inserted, the gap between the points of the jaws shall be 3 ± 1 mm.

9.6 Insulation Test

The insulated handles shall be immersed in a conducting fluid such as a solution of washing soda in water. Immersion shall be up to a distance from the end of the insulant sufficient to obviate any arcing between the solution and the head of the tool. The solution shall form one pole of an electric circuit, the opposite pole being formed by the jaws of the tool. The insulation shall then withstand a pressure of 2 800 volts (rms) ac or 4 000 volts dc. The pressure shall be maintained continuously for two minutes during which time, there shall be no breakdown of the insulation.

10 DESIGNATION

10.1 Gripping and Dual Purpose Pliers

For designating gripping and dual purpose pliers, the essential information shall be given in the following order in accordance with IS 11526 : 1986:

a) Shape of nose in the cross direction at the point,
b) Shape of nose in the longitudinal direction,
c) With or without serrations,
d) With or without grooves,
e) Field of application (for dual purpose pliers, specify test wire),
f) Shape of back of nose,
g) Shape of handles in the longitudinal direction,
h) Dimensions (nominal size), and
j) Number of the relevant Indian Standard.

10.2 Nippers

For designating nippers, the essential information shall be given in the following order in accordance with IS 11526 : 1986:

a) Direction and position of cutter,
b) Type and shape of edge,
c) Field of application,
d) Type of joint,
e) Shape of handles in the longitudinal direction,
f) Type of finish required,
g) Dimensions (nominal size), and
h) Number of the relevant Indian Standard.

11 SAMPLING

11.1 In order to ascertain the conformity of the lot, the procedure for sampling inspection as given in IS 2500 (Part 1) : 1973 shall be followed. The inspection level and AQL for various characteristics shall be according to **11.2** and **11.3**.

11.2 For dimensions, workmanship and finish, a single sampling plan with inspection level IV and AQL of 4 percent given in Tables 1 and 2 of IS 2500 (Part 1) : 1973 shall be followed .

11.3 For hardness and other test requirements given in **9**, a single sampling plan with inspection level II and AQL of 4 percent as given in Tables 1 and 2 of IS 2500 (Part 1) : 1973 shall be followed.

12 PRESERVATION AND PACKING

12.1 The tools shall be varnished or coated with a suitable anticorrosive paint or with mineral jelly reduced with turpentine oil, in order to protect them from corrosion.

12.2 Each tool shall be wrapped in kraft or waxed paper and then suitably packed in cardboard carton bearing the designation and nominal size of the tool and the manufacturer's name, initials and trade-mark.

13 MARKING

The pliers, pincers and nippers shall be clearly and legibly stamped with the manufacturer's name, initials and/or recognized trade-mark and year of manufacture, if required by the purchaser.

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Amendments Issued Since Publication

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BUREAU OF INDIAN STANDARDS

Headquarters:

Manak Bhavan, 9 Bahadur Shah Zafar Marg, New Delhi 110002
Telephones : 331 01 31, 331 13 75

Telegrams : Manaksanstha
(Common to all offices)

Regional Offices :		Telephone
Central	Manak Bhavan, 9 Bahadur Shah Zafar Marg NEW DELHI 110002	331 01 31 331 13 75
Eastern	1/14 C. I.T. Scheme VII M, V. I. P. Road, Maniktola CALCUTTA 700054	37 84 99, 37 85 61 37 86 26, 37 86 62
Northern	SCO 335-336, Sector 34-A, CHANDIGARH 160022	60 38 43 60 20 25
Southern	C. I. T. Campus, IV Cross Road, MADRAS 600113	235 02 16, 235 04 42 235 15 19, 235 23 15
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